

EXHIBIT 1

United States Patent [19]

Lau

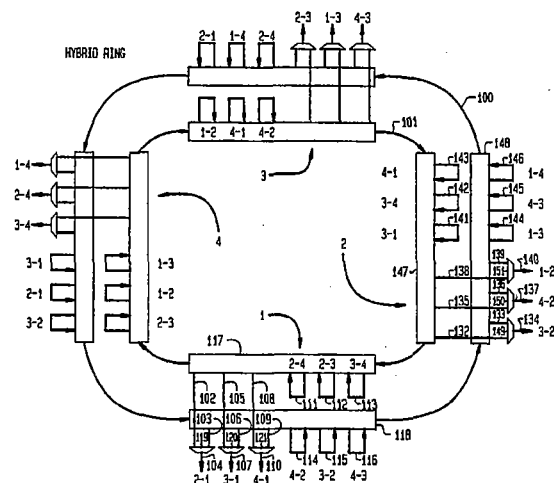
[11] Patent Number: **4,835,763**[45] Date of Patent: **May 30, 1989**[54] **SURVIVABLE RING NETWORK**[75] Inventor: **Chi-Leung Lau, Eatontown, N.J.**[73] Assignee: **Bell Communications Research, Inc.,
Livingston, N.J.**[21] Appl. No.: **152,238**[22] Filed: **Feb. 4, 1988**[51] Int. Cl.⁴ **H04J 1/16; H04J 3/14**[52] U.S. Cl. **370/16; 370/88**[58] Field of Search **370/13, 16, 88, 84,
370/89, 95; 371/8, 11**[56] **References Cited****U.S. PATENT DOCUMENTS**

Re. 28,958	9/1976	Zafiropulo et al.	340/147 SC
3,652,798	3/1972	McNeilly et al.	179/15 AL
4,370,744	1/1983	Hirano et al.	370/88
4,501,021	2/1985	Weiss	455/601
4,527,270	7/1985	Sweeton	371/11
4,530,085	7/1985	Hamada et al.	370/15
4,542,496	9/1985	Takeyama et al.	370/16
4,542,502	8/1985	Levinson et al.	370/88
4,553,233	11/1985	Debuysscher et al.	370/16

4,554,659	11/1985	Blood et al.	370/88
4,633,246	12/1986	Jones et al.	340/825.05
4,648,088	3/1987	Cagle et al.	370/16
4,683,563	7/1987	Rouse et al.	370/16
4,710,915	12/1987	Kitahara	370/16

Primary Examiner—Benedict V. Safourek*Assistant Examiner*—Wellington Chin*Attorney, Agent, or Firm*—James W. Falk; John T. Peoples[57] **ABSTRACT**

A survivable ring network is disclosed that can withstand a cut link or failed node, without the need for a central controller or protection switching among links. The disclosed invention comprises two rings carrying identical multiplexed node-to-node communications in opposite directions. When a system error is detected in a downstream node, error signals are inserted in all subrate channels. Each subrate channel receiver receives identical communications from each ring. If one subrate channel has an error signal, the receiver selects the alternate channel.

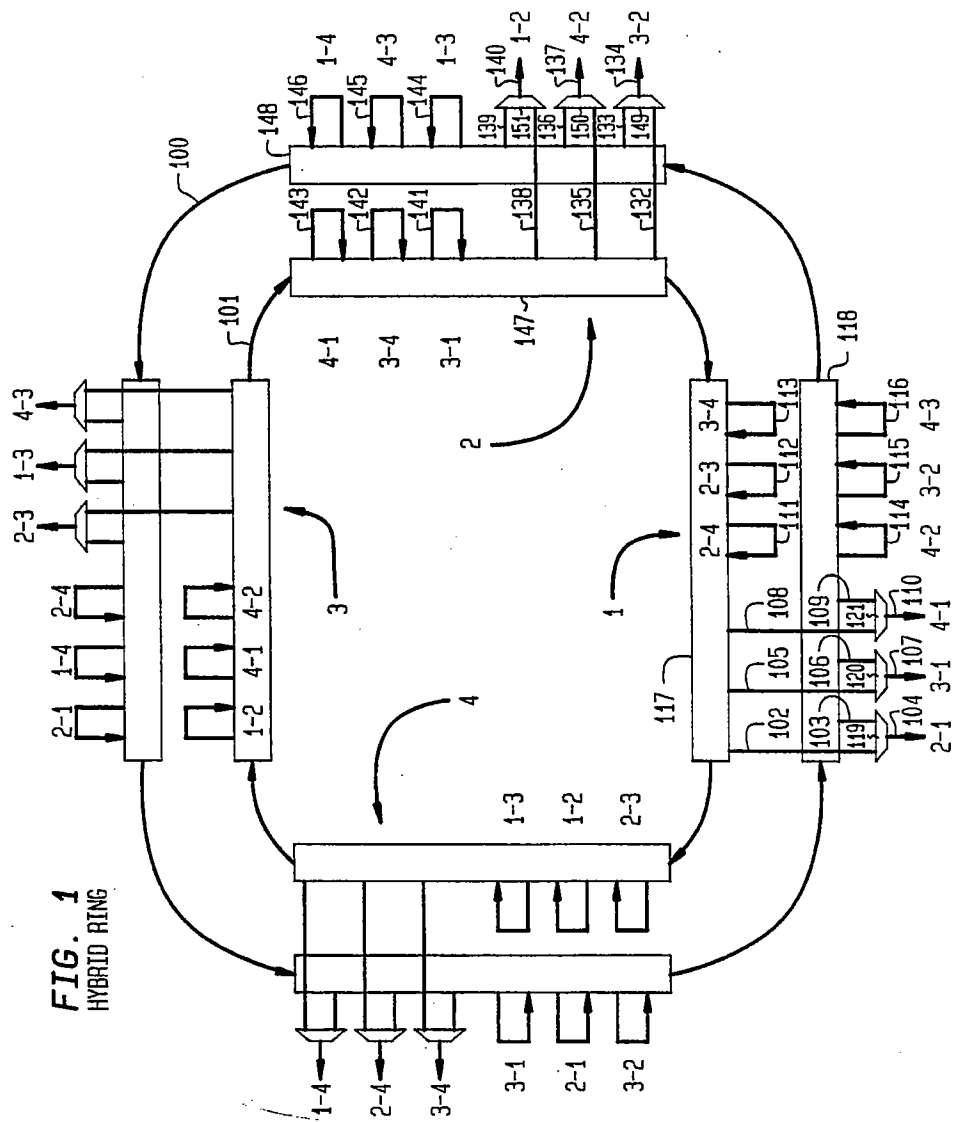
8 Claims, 4 Drawing Sheets

U.S. Patent

May 30, 1989

Sheet 1 of 4

4,835,763

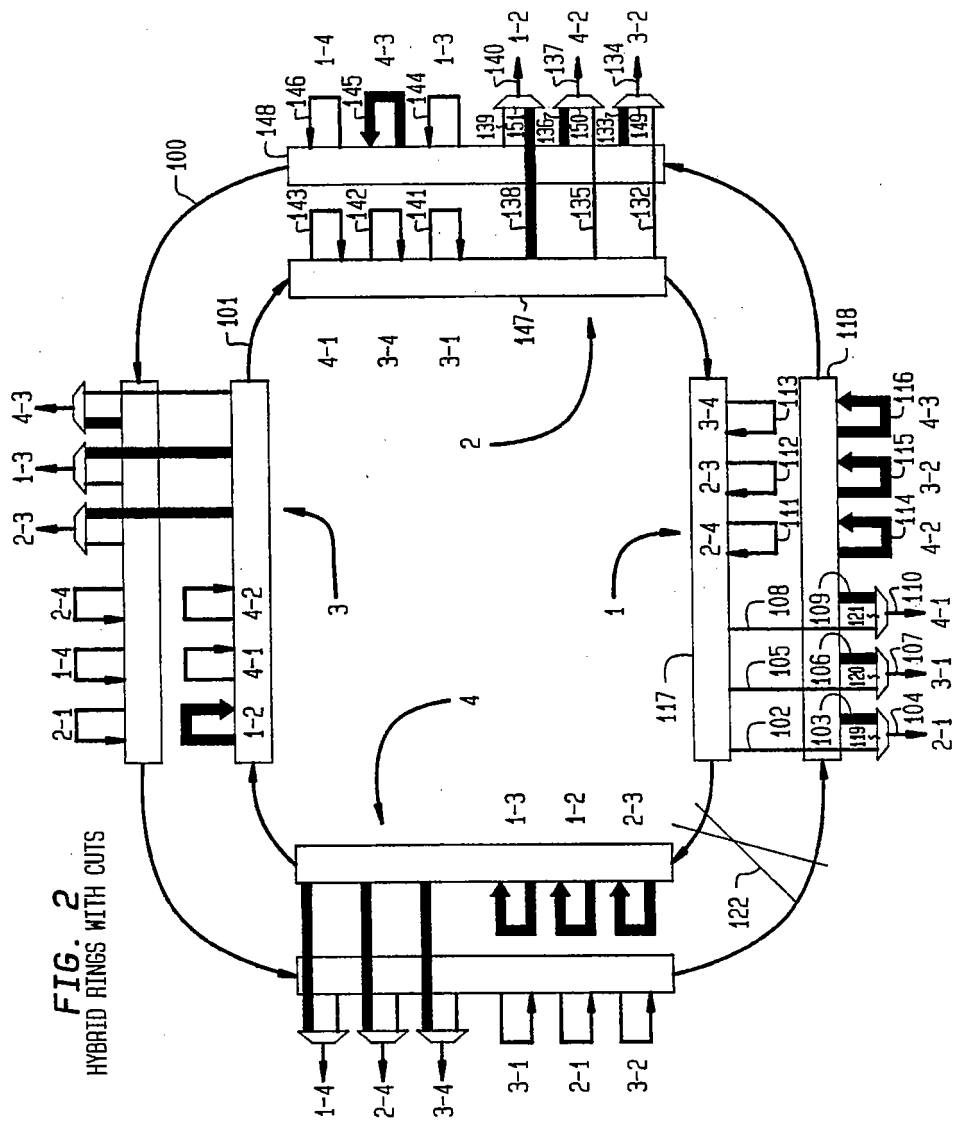


U.S. Patent

May 30, 1989

Sheet 2 of 4

4,835,763



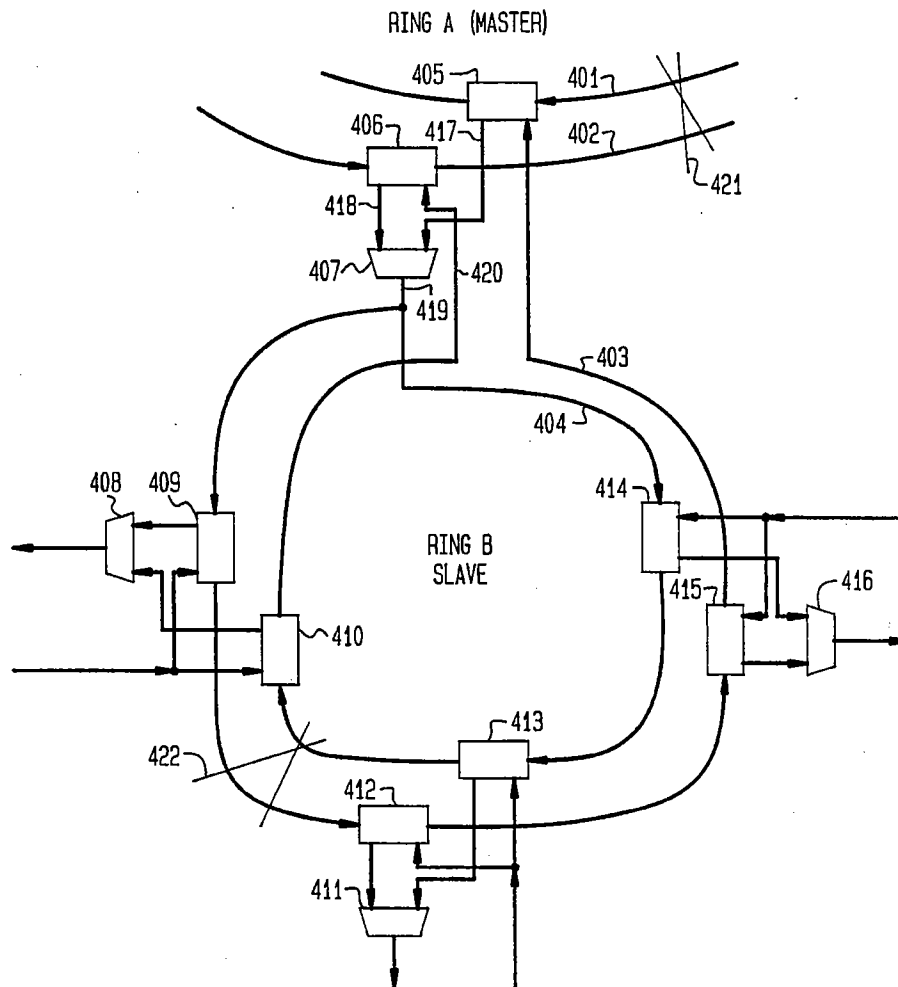
U.S. Patent

May 30, 1989

Sheet 3 of 4

4,835,763

FIG. 3



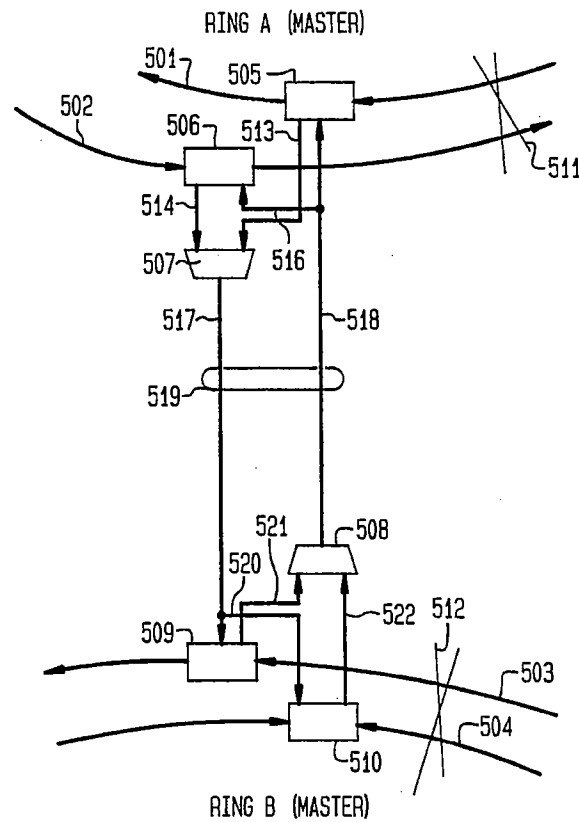
U.S. Patent

May 30, 1989

Sheet 4 of 4

4,835,763

FIG. 4



4,835,763

1

SURVIVABLE RING NETWORK

FIELD OF THE INVENTION

The invention relates generally to a communications network. Specifically, it relates to a self-healing ring network.

BACKGROUND OF THE INVENTION

A ring communications network is made up of nodes that are connected in tandem by a unidirectional communications path. Each node receives transmissions from the adjacent upstream node, and if the communication is destined for a downstream node, the communication is re-transmitted to the adjacent downstream node. Otherwise, each node transmits its own communications to the adjacent downstream node.

A drawback of such a network is that a break in the ring would prevent any node upstream of the break from communicating with any node downstream of the break. Similarly, the complete failure of a node would have the same effect as a break in the ring.

Many designs have been proposed to minimize these difficulties. The most common approach is to provide a second communications ring parallel to the first. In that case, a fault in one ring could be bypassed by transferring communications to the second ring. Alternatively, if the second ring transmitted in the opposite direction as the first, a break in both rings between two adjacent nodes could be remedied by the nodes on either side of the break looping back communications received on one ring onto the other ring. Such a system is described in McNeilly et al, U.S. Pat. No. 3,652,798.

The main problem with such approaches is that the equipment required to detect and locate a fault, and then appropriately reconnect transmitters and receivers with the alternate ring, is complicated and costly.

SUMMARY OF THE INVENTION

These and other difficulties are alleviated by my invention. A subrate multiplexed signal is utilized for ring communications. Each node has the capability of demultiplexing the main signal into its constituent subrates (channels), and channels destined for that node (local channels) are sent to receiving equipment within the node, while channels destined for downstream nodes (through channels) are multiplexed with originating local channels, and the resultant high level signal is transmitted to the adjacent downstream node. This process is simultaneously performed using identical equipment in the node for a second ring transmitting in the opposite direction. If a node detects a fault in an incoming line, an error signal is placed on all of the channels following the demultiplexing. The receiving equipment in each node includes a selector which monitors the communications arriving on each local channel from both rings. If an error signal is detected on a local channel, the selector selects the communication from the associated channel of the other ring to send to the receiver.

In this way, a break in both rings between two adjacent nodes will not cause a failure in the system, and no complicated fault locating and switching equipment is required to continue service. Similarly, the complete failure of a node will not destroy communications among the remaining nodes.

It should be noted that unlike prior survivable ring arrangements which maintain their ring characteristics

2

following a fault, my invention ceases functioning as a ring if the ring is broken. However, as previously discussed, communications among the nodes is maintained following such a break. I therefore term my network a hybrid ring, since it normally operates as a ring, but does not operate as a ring following a break in the ring or the loss of a node.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagram of the hybrid ring network; FIG. 2 is a diagram of the hybrid ring network with a break in both rings;

FIG. 3 is a diagram of a portion of a master/slave arrangement of two hybrid ring networks; and

FIG. 4 is a diagram of a portion of a master/master arrangement of two hybrid ring networks.

DETAILED DESCRIPTION

An illustrative embodiment of my invention is depicted in FIG. 1. In discussing FIG. 1, it is helpful to have the background provided by the reference entitled "Draft of American National Standard for Telecommunications Digital Hierarchy Optical Interface Rates and Formats Specifications" dated Dec. 11, 1987 as transmitted to the Secretariat of the Exchange Carriers Standards Association, T₁ Committee-Telecommunications. This reference is incorporated herein by reference. My invention is an improvement to the basic communication methodology discussed in this reference. Node 1 comprises controllers 117 and 118 and selectors 119-121. Controller 117 is connected with ring 101, which carries signals in a clockwise direction, and controller 118 is connected with ring 100, which carries signals in a counterclockwise direction. Illustratively, the signals on each ring comprise six subrate channels, each of which is dedicated to communications between a pre-selected pair of basically identical nodes. Each node feeds three subrate receivers (not shown), which in the case of node 1 have lines 104, 107 and 110, respectively, as input.

The channel carrying communications between nodes 1 and 2 would be extracted from ring 101 by controller 117 (by demultiplexing the signal on ring 101), and sent to selector 119 over line 102. Controller 118 would extract the associated channel off ring 100 and send it to selector 119 over line 103. Selector 119 would select one of the signals arriving on lines 102 and 103, based on the presence or absence of an error signal on either line. The selected signal would be sent to the receiver over line 104. A transmitter (not shown) would transmit two identical signals destined for node 2, one to controller 117 and one to controller 118, for reinsertion into the respective loops.

Channels associated with communications between nodes 3 and 1, and between nodes 4 and 1, would operate in a similar manner utilizing selectors 120 and 121, respectively. Controllers 117 and 118 then multiplex the three channels originating from node 1 with the three through channels, and transmit the resultant higher level signals on their associated loops (loop 101 toward node 4 and loop 100 toward node 2). In this way, each node has two redundant communications paths to each of the other nodes, both paths being continuously active.

The simplicity and elegance of my invention becomes apparent when a break occurs in the rings, as shown in FIG. 2. If rings 100 and 101 are broken between node 1

4,835,763

3

and node 4, two simultaneous activities take place which will preserve communications paths among all of the nodes.

Each node continuously monitors and evaluates the integrity of the multiplexed subrate signals arriving at the node. Illustratively, this could be accomplished by detecting the absence of a carrier signal in an analog signal environment, or the lack of any incoming signal in a digital environment. When node 1 recognizes major line fault 122 in ring 100, controller 118 inserts an error signal onto the six subrate channels. This could illustratively be accomplished by inserting a string of 1's on each channel in a digital environment. Node 4 performs the identical activity by similarly placing an error signal on the six subrate channels of ring 101. After these two relatively simple procedures take place, the ring network otherwise operates normally.

In node 1, selector 119 chooses line 102 because line 103 has an error signal on it (designated by dashed line 103). Similarly, selector 120 selects line 105 because line 106 has an error signal, and selector 121 selects line 108 because line 109 contains an error signal. The three through channels on ring 100 that contain error signals are then multiplexed with the three local channels that now have valid data originating from node 1 and the higher level signal is transmitted to node 2 over ring 100.

Because the higher level signal arriving at node 2 on ring 100 appears normal, controller 148 demultiplexes the higher level signal into its six subrate channels, three of which terminate at node 2. The first local channel contains communications from node 3 to node 2. An error signal was generated on this channel at node 1. Controller 148 sends this error signal to selector 149 via line 133. Selector 149 therefore selects line 132 from controller 147, containing traffic from node 3 to node 2 over ring 101, which is not affected by break 122.

Similarly, selector 150 recognizes the error signal on line 136 and selects line 135. Selector 151 receives communications from node 1 over line 139 from ring 100 and receives an error signal over line 138 from ring 101. Therefor, selector 151 would select line 139.

Communications from node 1 to node 3 and from node 1 to node 4 are multiplexed from lines 144 and 146 by controller 148. Communications from node 4 to node 3 are also multiplexed from line 145 by controller 148, thereby passing along the error signal contained therein to node 3 over ring 100.

Each node operates in the above manner to insure continuity of communications among the nodes following a ring failure; or, as in the case of break 122, a multiple ring failure between two adjacent nodes. If a node fails, the same process will maintain communications among the remaining nodes.

It should be readily apparent that other techniques could be employed without departing from the scope of my invention, such as designating the destination node within each message, and having each node read the destination of each message passing through the node, and selecting messages destined for itself.

FIG. 3 depicts an embodiment of my invention wherein two ring sets are joined in a dual-ring configuration at a common node (gateway node). Ring arrangement A is designated the master ring and ring arrangement B is designated the slave ring. Controller 405 of the gateway node extracts a pre-selected subrate channel off ring 401 and sends the extracted channel to selector 407 over line 417. Controller 406 sends a similarly

4

pre-selected subrate channel from ring 402 to selector 407 over line 418. Selector 407 chooses a non-error signal line for insertion onto slave rings 403 and 404 via line 419. In this way, any one break in the master rings 401 and 402 will not prevent a valid subrate channel from being inserted onto slave ring 403.

Controllers 409 and 410 insert and extract communications on rings 403 and 404, respectively, and selector 408 chooses a non-error signaled input. If, illustratively, break 422 occurs on rings 403 and 404, controllers 412 and 410 will insert error signals on associated subrate paths, and controllers 409, 413, 414 and 415 would operate as if no break occurred. Selectors 408, 411 and 416 would select inputs that do not contain error signals. It should be readily apparent that a two-ring break in either the master ring or the slave ring would not result in the loss of communications between any two nodes. However, simultaneous breaks in both the master and slave rings would result in selected communications losses.

FIG. 4 depicts two interrelated rings that can withstand simultaneous breaks in both rings without loss of communications between any two nodes, by employing a master-master relationship. Instead of one gateway node connecting the two rings, one node on each master ring is connected by link 519. Controllers 505 and 506 send a subrate communications channel to selector 507, and controllers 509 and 510 send a subrate communications channel to selector 508. If there is a break in ring A, selector 507 will select the non-error signal communication from line 513 or line 514 and transmit to ring B via line 517, and similarly, if there is a break in ring B, selector 508 will select the non-error signal communication from line 521 or 522 and transmit to ring A via line 518. It should be readily apparent that simultaneous breaks in both ring A and ring B will not result in the loss of communications between any two nodes.

My invention will work regardless of whether the ring networks are copper or fiber, and regardless of what higher rates and substrates are utilized. The dual ring embodiment depicted on FIG. 3 is most beneficially suited to multiple levels of subrating. For instance, in FIG. 3, if ring A carried a signal which could be demultiplexed into two subchannels by controllers 405 and 406, one subchannel could be sent to ring B by selector 407. Controllers 409-410 and 412-415 on ring B would then further demultiplex the subchannel for communications terminating at nodes on ring B.

Those ordinarily skilled in the art could make obvious modifications to my invention without departing from its scope.

What is claimed is:

1. In a communications network having a plurality of nodes interconnected in a ring configuration by a first ring which conveys multiplexed subrate communications around the first ring from node to node in one direction and a second ring which conveys multiplexed subrate communications around the second ring from node to node in the other direction, each node including subrate transmitters with associated multiplexers and demultiplexers with associated subrate receivers, an improved node comprising

monitoring means, associated with the first ring and the second ring, for evaluating the integrity of the multiplexed subrate communications on the first ring and the second ring, respectively, and insertion means, associated with the demultiplexers and said monitoring means, for inserting an error

4,835,763

5

signal on designated ones of the subrate communications in response to said monitoring means detecting a lack of integrity on the multiplexed subrate communications on the first ring or the second ring or both the first ring and the second ring.

2. In the communications network of claim 1, the improved node further comprising selector means associated with the demultiplexers for selecting, in response to the detection of said error signal on one of the subrate communications, another of the subrate communications that does not contain said error signal.

3. In the communications network of claim 1, the improved node wherein the multiplexers multiplex selected subrate communications containing said error signal into a multiplexed subrate communication for transmission onto the first ring or the second ring or both in correspondence to said detection of said error signal.

4. A communications network having a plurality of nodes interconnected in a ring configuration by a first ring which conveys multiplexed subrate communications around the first ring from node to node in one direction and a second ring which conveys multiplexed subrate communications around the second ring from node to node in the other direction, each of said nodes including subrate transmitters and subrate receivers and further comprising:

monitoring means, associated with the first ring and the second ring, for evaluating the integrity of the multiplexed subrate communications on the associated first ring and the associated second ring, respectively,

means for demultiplexing the multiplexed subrate communications on the associated first ring and the associated second ring into subchannels wherein at least one of said subchannels is sent to one of the corresponding receivers,

insertion means associated with said demultiplexing means to insert an error signal on each of said subchannels in response to said monitoring means detecting a lack of integrity on the multiplexed subrate communications on the associated first ring or the associated second ring or both the associated first ring and the associated second ring,

selector means associated with said demultiplexing means for selecting, in response to the detection of said error signal on one of the subchannels, one of the other subchannels, and

multiplexing means for multiplexing subchannels and inserting multiplexed subrate communications onto the associated first ring and the associated second ring, respectively.

5. A communications network having a first grouping of nodes interconnected by a first ring arrangement, a second grouping of nodes interconnected by a second ring arrangement, each ring arrangement conveying multiplexed subrate communications in a first direction from node to node and conveying multiplexed subrate communications in a second direction from node to node, and each node includes subrate transmitters with associated multiplexers and demultiplexers with associated receivers, and wherein

6

each node comprises

monitoring means, associated with the ring arrangement connected to said each node, for evaluating the integrity of the multiplexed subrate communications on said associated ring arrangement,

insertion means, associated with its demultiplexers and its monitoring means, for inserting an error signal on designated ones of said subrate communications in response to said monitoring means detecting a lack of integrity on said multiplexed subrate communications on its said associated ring arrangement, and

selector means, associated with its demultiplexers, for selecting, in response to the detection of said error signal on a subrate communication, a subrate communication that does not contain an error signal, and

wherein a preselected node of the first ring arrangement comprises;

means, connected to the first ring arrangement and the second ring arrangement, for directing at least one subrate communication to the second ring arrangement and corresponding subrate communications from the second ring arrangement for multiplexing onto multiplexed subrate communications on the first ring arrangement.

6. The network of claim 5

wherein said subrate communication directed to the second ring arrangement is received by a preselected node of the second ring arrangement for multiplexing into multiplexed subrate communications around the second ring arrangement,

and wherein the subrate communications directed to the first ring arrangement originates at said preselected node of the second ring arrangement.

7. In a communications network having a plurality of nodes interconnected in a ring configuration by a first ring which conveys multiplexed subrate communications around the first ring from node to node in one direction and a second ring which conveys multiplexed subrate communications around the second ring from node to node in the other direction, each node including subrate transmitters with associated multiplexers and demultiplexers with associated receivers, an improved method associated with each node comprising the steps of

evaluating the integrity of the multiplexed subrate communications on the first ring and the second ring with monitoring means associated with both the first ring and the second ring, and

inserting an error signal on designated ones of said subrate communications in response to said monitoring means detecting a lack of integrity on said multiplexed communications on the first ring or the second ring or both the first ring and the second ring.

8. The method as recited in claim 7 further comprising the step of selecting, in response to the detection of said error signal on said at least one of the subrate communications, another of the subrate communications that does not contain an error.

* * * * *

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

PATENT NO. : 4,835,763

DATED : May 30, 1989

INVENTOR(S) : Chi-Leung Lau

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4, line 57, change "scond" to --second--.

Column 5, line 52, change "seocnd" to --second--.

**Signed and Sealed this
Eighth Day of September, 1992**

Attest:

DOUGLAS B. COMER

Attesting Officer

Acting Commissioner of Patents and Trademarks

EXHIBIT 2

CONFIDENTIAL EXHIBIT

EXHIBIT 3

CONFIDENTIAL EXHIBIT

EXHIBIT 4

CONFIDENTIAL EXHIBIT

EXHIBIT 5

CONFIDENTIAL EXHIBIT

EXHIBIT 6

CONFIDENTIAL EXHIBIT

EXHIBIT 7

CONFIDENTIAL EXHIBIT

EXHIBIT 8

CONFIDENTIAL EXHIBIT

EXHIBIT 9

CONFIDENTIAL EXHIBIT

EXHIBIT 10

LEXSEE 1996 US APP LEXIS 13330

**Ecolochem, Inc., Plaintiff-Appellant, v. Southern California Edison Company,
Defendant-Appellee.****95-1320****UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT***1996 U.S. App. LEXIS 13330***June 5, 1996, Decided**

NOTICE: [*1] RULES OF THE FEDERAL CIRCUIT COURT OF APPEALS MAY LIMIT CITATION TO UNPUBLISHED OPINIONS. PLEASE REFER TO THE RULES OF THE UNITED STATES COURT OF APPEALS FOR THIS CIRCUIT.

SUBSEQUENT HISTORY: Rehearing Denied and In Banc Suggestion Declined July 30, 1996, Reported at: *1996 U.S. App. LEXIS 20438*. Reported in Table Case Format at: *91 F.3d 169, 1996 U.S. App. LEXIS 37040*.

PRIOR HISTORY: U.S. District Court for the Central District of California. No. CV 92-3436 RG.

DISPOSITION: Affirmed-in-part, reversed-in-part, and remanded for further proceedings not inconsistent with this opinion.

CASE SUMMARY:

PROCEDURAL POSTURE: Plaintiff patent holder appealed a judgment of the U.S. District Court for the Central District of California, which granted defendant corporation's motion for summary judgment in the patent holder's action against the corporation.

OVERVIEW: In the patent holder's action against the corporation, the trial court found that claims in two chemical patents, denoted 492 and 411, were obvious and anticipated. On review, the court concluded that claims in the 492 patent were anticipated by prior art because each and every limitation of the claims was found in a single prior art reference. Additionally, the court held that two claims in the 492 patent were void for obviousness in light of the prior art. However, the court concluded the

trial court erred in its analysis determining that a claim of the 411 patent was void for obviousness. In reaching its conclusion, the court held that the trial court failed to properly examine secondary factors that had an effect on the weight given to the prior art when determining whether the claim was obvious.

OUTCOME: The court affirmed the order granting the corporation's motion for summary judgment as to claims of obviousness and anticipation on one patent. However, the court reversed the order granting summary judgment as to obviousness on a second patent.

LexisNexis(R) Headnotes

Civil Procedure > Summary Judgment > Appellate Review > Standards of Review

Civil Procedure > Appeals > Standards of Review > De Novo Review

Patent Law > Infringement Actions > Summary Judgment > Appeals

[HN1] An appellate court reviews a district court's grant of summary judgment de novo, resolving all doubts respecting the presence or absence of genuine factual issues in the nonmovant's favor. In a patent case, proper claim construction is a question of law which the United States Court of Appeals for the Federal Circuit reviews de novo.

Patent Law > Anticipation & Novelty > Elements

[HN2] In patent law, anticipation is shown where each and every limitation of the claimed invention is found in a single prior art reference.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN3] A claim is construed by looking at the language of the claim, other claims in the patent, the specification and, where in evidence, the prosecution history.

Patent Law > Claims & Specifications > Claim Language > Preambles

Patent Law > Infringement Actions > Exclusive Rights > General Overview

[HN4] A patentee may not import additional limitations into the steps of a process claim merely by using the word "comprising" in the claim preamble.

Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview

Patent Law > Nonobviousness > Elements & Tests > Prior Art

Patent Law > Nonobviousness > Elements & Tests > Secondary Considerations

[HN5] In determining whether a patent's claim is obvious, prior art may affect the weight of the evidence of secondary considerations and vice versa.

JUDGES: Before Newman, Michel and Clevenger, Circuit Judges. Opinion for the court filed by Circuit Judge Michel. Opinion concurring-in-part and dissenting-in-part filed by Circuit Judge Newman.

OPINION BY: Michel

OPINION: Michel, *Circuit Judge*.

Decision

Ecolochem, Inc. (Ecolochem) appeals the summary judgment of the U.S. District Court for the Central District of California, No. CV 92-3436 RG, finding claims 1, 2, 5 and 6 of U.S. Patent No. 4,556,492 (the '492 patent) anticipated, and holding claims 7 and 10 of the '492 patent and claim 20 of U.S. Patent No. 4,818,411 (the '411 patent) obvious. The appeal was submitted for decision after oral argument on December 7, 1995. We affirm the findings of anticipation and the conclusions of obviousness of claims 7 and 10 of the '492 patent, but reverse the conclusion of obviousness [*2] of claim 20 of the '411 patent and remand for further proceedings.

I. Background

Ecolochem combined the Houghton process with an ion exchange resin to remove excess hydrazine and carbon contaminants and was awarded two patents based on this invention, the '492 patent and the '411 patent (a continuation of the '492 patent application). As prior art, the examiner cited references to applications of the Houghton process and the known use of hydrazine to deoxygenate liquid. In addition, with respect to the '411 patent, the examiner cited references, including Akol'zin, that teach the use of filters and ion exchange resins to remove liquid contaminants. Claim 1 of the '492 patent reads:

1. a deoxygenation process comprising a first step of adding hydrazine to a liquid containing dissolved oxygen, a second step of passing said liquid through a bed of activated carbon to catalyze a reaction between said dissolved oxygen and said hydrazine whereby an amount of dissolved carbon contaminants are added to said liquid, and a third step of passing said liquid through an ion exchange resin selected from the group consisting of mixed bed resin and cation resin to remove at least said dissolved [*3] contaminants.

(Claims 2, 5, and 6 are dependent on independent claim 1; claim 7 is dependent on claim 6; claim 10 is dependent on claim 9 which is dependent on independent claim 8.) Claim 1 recites three basic steps: 1) adding hydrazine to a liquid containing dissolved oxygen, 2) catalyzing the reaction between the dissolved oxygen and the hydrazine using activated carbon, and 3) removing dissolved carbon contaminants with an ion exchange resin. Claim 2 adds a filtration step to remove undissolved carbon contaminants; claim 5 recites the additional removal of unreacted hydrazine through the ion exchange resin; claim 6 limits the liquid of claim 1 to water; claim 8 is similar to claim 1 but requires the removal of excess hydrazine in the third step, not the dissolved carbon contaminants; and claims 7 and 10 add a final step of circulating the deoxygenated water at elevated temperature conditions in a power generating apparatus. Claim 20 of the '411 patent is similar to claim 1 of the '492 patent but omits the first step of the process, taking into account that hydrazine may already be present, and

claims the removal of dissolved carbon contaminants with both cation and anion [*4] exchange resins in series. On Southern California Edison Co.'s (Edison) motion for summary judgment, the district court found that claims 1, 2, 5 and 6 of the '492 patent are anticipated by Demmitt, a reference not considered by the examiner during prosecution of the application leading to the issuance of the patents in suit, and held that, in light of Demmitt, claims 7 and 10 of the '492 patent and claim 20 of the '411 patent are obvious under 35 U.S.C. § 103. n1 Ecolochem appeals from the judgment based on these findings and conclusions which it challenges.

n1 Claims 8 and 9 of the '492 patent and claim 21 of the '411 patent were also held anticipated, but these findings are not being appealed.

II. Standard of Review

[HN1] We review the district court's grant of summary judgment *de novo*, resolving all doubts respecting the presence or absence of genuine factual issues in the nonmovant's favor. *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 619, 34 U.S.P.Q.2D (BNA) 1816, 1819 (Fed. [*5] Cir. 1995). Proper claim construction is a question of law which we review *de novo*. *Markman v. Westview Instruments, Inc.* 52 F.3d 967, 979, 34 U.S.P.Q.2D (BNA) 1321, 1329 (Fed. Cir. 1995) (in banc), *aff'd*, 116 S. Ct. 1384 (1996).

III. Anticipation

It is undisputed that the Demmitt reference discloses an application of the Houghton process followed by the use of a cation exchange resin to remove hydrazine from the liquid. The reference does not disclose that carbon contaminants are added to the liquid by the Houghton process, nor does it indicate the desirability of removing those dissolved carbon contaminants. By its very nature, however, the cation resin removes cationic dissolved carbon contaminants. Furthermore, it is agreed by the parties that most, if not all, carbon sources used in the Houghton process would leach anionic as well as cationic contaminants. [HN2] Since anticipation is shown where each and every limitation of the claimed invention is found in a single prior art reference, *In re Donohue*, 766 F.2d 531, 534, 226 U.S.P.Q. (BNA) 619, 621 (Fed. Cir.

1985), Demmitt anticipates claim 1 if that claim requires only the removal of dissolved cationic carbon contaminants, rather than [*6] all of the dissolved carbon contaminants, both cationic and anionic.

[HN3] A claim is construed by looking at the language of the claim, other claims in the patent, the specification and, where in evidence, the prosecution history. *Markman*, 52 F.3d at 979, 34 U.S.P.Q.2D (BNA) at 1329. Claim 1 recites a "deoxygenation process comprising a first step of adding hydrazine . . . a second step . . . [where] carbon contaminants are added . . . and a third step of passing said liquid through an ion exchange resin selected from the group consisting of mixed bed resin and cation resin to remove at least said dissolved contaminants." Ecolochem argues that it is clear from the language of the claim itself, the specification, and the prosecution history of the patent that claim 1 recites a process including a limitation that all dissolved carbon contaminants are to be removed by the ion exchange resin.

Analyzing the language of the claim, we observe that step three of claim 1 is written in the alternative using the Markush format. By claiming a Markush group, Ecolochem has indicated that, for the purpose of claim validity, the members of the claimed group are functionally equivalent. Thus, if utilizing [*7] one element of the group is anticipated or obvious, the patentee is precluded from arguing that the claim is valid. *See In re Skoll*, 523 F.2d 1392, 1397, 187 U.S.P.Q. (BNA) 481, 484-85 (CCPA 1975). Accordingly, if either alternative in the Markush group of step three, *i.e.*, employing a cation resin or a mixed bed resin, is anticipated, the entire claim is anticipated.

Demmitt clearly discloses the use of the Houghton process on oxygenated water followed by use of a cation exchange resin. As discussed above, Demmitt meets all the limitations of one of the claimed alternatives in claim 1 of the '492 patent (*i.e.*, using a cation exchange resin to remove dissolved contaminants). Accordingly, it would appear that claim 1 is anticipated by Demmitt.

Ecolochem argues, however, that, despite the recitation of a cation exchange resin as an element of the Markush group, there is a limitation in the claim requiring that all dissolved carbon contaminants be removed. This result can be accomplished, Ecolochem claims, by the use of a mixed bed resin or by the use of a cation resin in combination with an anion resin, and since

claim 1 is written using the open-ended term "comprising," the claim [*8] should be construed to include the use of additional elements, *i.e.*, addition of an anion resin to follow the cation resin of the second alternative. Placement of "comprising" before recitation of steps, however, results in a "comprising" claim that would cover a process that includes additional steps, not one that uses an additional unrecited element for accomplishing a claimed step. *See Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1271, 229 U.S.P.Q. (BNA) 805, 812 (Fed. Cir. 1986), *cert. denied*, 479 U.S. 1030, 93 L. Ed. 2d 829, 107 S. Ct. 875 (1987) ("While a transitional term such as 'comprising' or, as in the present case, 'which comprises,' does not exclude additional unrecited . . . steps . . . we conclude that the transitional phrase does not . . . affect the scope of the particular structure recited within the method claim's steps.") Thus, all the claim requires, in step three, is that either a mixed bed resin or a cation exchange resin be used *exclusively* to achieve the stated goal of removing dissolved carbon contaminants added in step two. In sum, [HN4] a patentee may not import additional limitations into the steps of a process claim merely by using the word "comprising" in the claim preamble. [*9] Accordingly, claim 1 is anticipated by Demmitt. n2

n2 The dissent asserts that "anticipation requires that the patented invention was previously known and is described in a single reference." Dissent at 1. The test for anticipation, however, is not a literal word for word comparison between the prior art and the commercial embodiment of the patentee's invention; the test is whether "each and every element *as set forth in the claim* is found, either expressly or inherently described, in a single prior art reference." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1570, 7 U.S.P.Q.2D (BNA) 1057, 1064 (Fed. Cir. 1988) (emphasis added); *Glaverbel Societe Anonyme v. Northlake Marketing & Supply, Inc.*, 45 F.3d 1550, 1554, 33 U.S.P.Q.2D (BNA) 1496, 1498 (Fed. Cir. 1995) ("the claimed process, including each step thereof, must have been described or embodied, either expressly or inherently, in a single reference.") (Newman, J.) (emphasis

added); *Standard Havens Prods., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1369, 21 U.S.P.Q.2D (BNA) 1321, 1328 (Fed. Cir. 1991) ("An anticipation reference, however, need not duplicate word for word what is in the claims. Anticipation can occur when a claimed limitation is 'inherent' or otherwise implicit in the relevant reference."). As previously discussed, the cation exchange resin disclosed by Demmitt would inherently remove cationic dissolved contaminants, and the claim, as written, requires no more than the removal of those cationic dissolved contaminants.

Although there is support in the '492 patent specification for a claim that would require the removal of all dissolved contaminants, including anionic contaminants, the applicant did not draft such a claim for the '492 patent. In fact, he did with claim 20 of the '411 patent. *See* discussion on obviousness *infra*. Although we construe limitations narrowly to save the validity of patents, we are precluded from rewriting the patent claim to include unclaimed limitations even where the specification contains adequate support thereof. *See, e.g., Becton Dickinson & Co. v. C.R. Bard, Inc.*, 922 F.2d 792, 799 n.6, 17 U.S.P.Q.2D (BNA) 1097, 1102 n.6 (Fed. Cir. 1990) ("Nothing in any precedent permits judicial redrafting of claims.").

[*10]

Because Demmitt clearly discloses the use of water as the liquid to deoxygenate and that the cation exchange resin can be used to remove excess hydrazine, claims 5 and 6 of the '492 patent are anticipated by Demmitt as well. It is unclear why claim 2, which also calls for the removal of undissolved contaminants, was found to be anticipated by Demmitt. In any event, because Ecolchem fails to distinguish claim 2 from claim 1 for purposes of anticipation, we also affirm the finding on summary judgment that, on the undisputed facts, Demmitt anticipates claim 2. n3

n3 The dissent states that Ecolochem distinguishes claim 2 from claim 1 of the '492 patent for purposes of anticipation by stating that "claim 2 requires the presence of a fourth filtration step to remove undissolved active carbon contaminants." Dissent at 2 (emphasis in original). This statement was made in the background section of Ecolochem's brief for the purpose of listing the claims in suit. In the argument section of its brief, however, Ecolochem asserts that "the anticipation issues center on the interpretation of claim 1 of the '492 patent" and does not distinguish claim 2 as being patentably distinct from claim 1.

[*11]

IV. Obviousness

A. Claims 7 and 10 of the '492 Patent

The district court held claims 7 and 10 of the '492 patent obvious in light of the prior art. Claim 7 is dependent on claim 6, held to be anticipated by Demmitt, and claim 10 is dependent on claim 9, admitted by Ecolochem to be anticipated by Demmitt. Both claims add a final step of circulating the deoxygenated water at the conditions of elevated temperature in a power generating apparatus. The Demmitt reference specifically states that the tests he was conducting were on a system that "would be useful in high temperature reactors." In addition, the 1982 Bechtel reference (Bechtel) discusses the benefits of using carbon catalyzed hydrazine in a PWR steam generator. Accordingly, the district court was correct in concluding that claims 7 and 10 would have been obvious under 35 U.S.C. § 103 in light of Demmitt and Bechtel. n4

n4 The dissent characterizes the majority opinion as holding claims 7 and 10 obvious because the "independent claims from which they depend are 'anticipated,'" thereby accusing the majority of using a patent's claims as "prior art against itself." Dissent at 3. This is inaccurate. Claims 7 and 10 are held obvious in light of Demmitt and Bechtel because they claim a recommended use of

the process employed in Demmitt.

In addition, the dissent points out that the process commercially employed by Ecolochem to deoxygenate liquid in a power plant arguably fulfilled a long felt need, was a commercial success, and might not be obvious in light of Demmitt. Dissent at 3-4. However, as discussed *supra*, claims 7 and 10 of the '492 patent fail to recite features employed by Ecolochem in its commercial embodiment. Neither dependent claims 7 and 10, nor independent claims 1 and 8 upon which they respectively depend, require the use of both anionic and cationic resins to remove all dissolved carbon contaminants as employed in Ecolochem's commercial embodiment which forms the basis of Ecolochem's evidence of commercial success. Secondary considerations are only legally relevant where they relate to the patented process, not unclaimed features of a commercial embodiment. *In re Vamco Machine and Tool, Inc.*, 752 F.2d 1564, 1577, 224 U.S.P.Q. (BNA) 617, 625 (Fed. Cir. 1985) (court found "no 'secondary considerations' in [that] case having a bearing on the legal issue of the obviousness of the invention" where affidavits extolled the virtues of a commercial embodiment that was different from the claimed invention).

Claims 7 and 10 of the '492 patent recite nothing more than the process taught in Demmitt plus a final step of circulating the deoxygenated water at the conditions of elevated temperature in a power generating apparatus. We agree with the dissent that the proper test for obviousness is not whether a judge sitting today would find the invention obvious. However, it is not "hindsight" to hold as we do that this invention would have been obvious at the time of the application to the ordinary artisan in light of the clear teachings of the prior art and the meaning of the claim as properly interpreted. The environment claimed in claims 7 and 10 is

clearly suggested by Demmitt as well as the Bechtel reference. *See text supra.*

[*12]

B. Claim 20 of the '411 Patent

The district court also concluded that claim 20 of the '411 patent would have been obvious in light of the other prior art read in conjunction with Demmitt. Claim 20 of the '411 patent recites the same process as claim 1 of the '492 patent except that it begins with hydrazine already in the liquid and it specifies the use of a cation resin in series with an anion resin to remove carbon contaminants. As Demmitt discloses adding the hydrazine, starting with hydrazine already in the liquid is inherently taught by Demmitt. Claim 20 of the '411 patent, as opposed to claim 1 of the '492 patent, however, requires use of both cationic and anionic resins and can be read to require the removal of all dissolved carbon contaminants.

In a prior action, the broader '492 patent had been held not to be invalid for obviousness. *Ecolochem, Inc. v. Mobile Water Tech. Co.*, 690 F. Supp. 778 (E.D. Ark. 1988), *aff'd*, 871 F.2d 1096 (Fed. Cir. 1989) (table) (hereinafter *Mobile Water*). In the present case, the district court found that although prior art before the court in *Mobile Water* did not offer any suggestion to combine the Houghton process with ion [*13] resin filtration of contaminants, the Demmitt reference, not before the Arkansas district court, clearly did so. The court below then found that "Demmitt suggests that adding an ion exchange resin to the end of the Houghton process will remove impurities in the effluent."

The district court clearly mischaracterized the import of Demmitt as a prior art reference for the determination of obviousness of claim 20. Demmitt, though anticipating claims 1, 2, 5 and 6 of the '492 patent, did not disclose the removal of carbon contaminants with an ion exchange resin. The only real discussion of the resin is in connection with a formula showing how hydrazine, not dissolved carbon contaminants, can be removed from the liquid. The only "suggestion" made by Demmitt is that it would remove hydrazine, and not other "impurities in the effluent" as stated by the district court. Furthermore, the Akol'zin reference, which does disclose the Houghton process in combination with an ion exchange filter, was cited on the front page of the '411 patent and was thus

before the patent examiner, as well as the court in *Mobile Water*. 690 F. Supp. at 782. This reference discloses a process for using hydrazine [*14] to deoxygenate a liquid and then filtering the liquid through two filters, "the first containing activated carbon and the second containing an ion exchanger AV-17." Like Demmitt, Akol'zin uses an ion exchange resin to filter the effluent. However, as with Demmitt, the reference "does not teach the use of a mixed bed resin to remove ionic impurities introduced by leaching from the activated carbon." *Id.* Demmitt teaches no more than Akol'zin and is, therefore, merely cumulative.

Despite the district court's mischaracterization of the importance of Demmitt, Ecolochem concedes that there is a "prima facie case of obviousness before Demmitt and there remains one after." However, Ecolochem argues that the secondary considerations, in this case, could rebut the prima facie case and that the district court wrongly failed to consider its evidence of secondary considerations and conclude that the evidence raised a genuine issue of fact requiring trial. We agree.

The district court asserted that "secondary considerations carry little weight where a critical prior art reference has long been neglected," citing *Graham v. John Deere Co.*, 383 U.S. 1, 36, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966). Upon finding that Demmitt [*15] was such a critical prior art reference, the district court discounted any effect of the secondary considerations. Contrary to the actions of the district court in this case, however, the court in *Graham* fully evaluated the secondary consideration but found that in those circumstances, the secondary factors failed to "tip the scales of patentability." *Id.* It is not the law that secondary considerations carry little weight, just that [HN5] prior art may affect the weight of the evidence of those considerations and vice versa. In addition, as discussed above, Demmitt, being merely cumulative, is not a "critical" but an uncited ("long neglected") reference. Hence, it adds nothing to the prior art before the patent examiner and the court in *Mobile Water*.

Ecolochem has put forth a large quantity of evidence of secondary considerations to show that the process of its invention was not obvious. Included was evidence: that there was a long-felt, unsolved need in the industry; that many tried but failed to find a solution; that various references taught away from the invention as they warned against the Houghton process because of the carbon

contaminants; that customers have been satisfied [*16] with Ecolochem's process; that Ecolochem's invention has been widely discussed and favorably received; that Ecolochem's process has had a large impact on the industry; that others have tried to copy Ecolochem's process; and that Ecolochem has had great commercial success due to the patented invention. These are material facts for determining obviousness which, if found by the fact-finder in favor of Ecolochem, could have tipped the scales to validity as in the *Mobile Water* court.

The district court did not make any findings with respect to the credibility or weight of Ecolochem's evidence regarding secondary considerations, and it would have been improper to do so on summary judgment. Edison, on its part, has put forth evidence to refute Ecolochem's evidence regarding secondary considerations. Accordingly, there are genuine issues of material fact as to secondary considerations that can only be resolved at trial. Only then will the district court be in a position to assess the prior art in light of the secondary considerations to determine whether the prima facie case of obviousness has been overcome.

V. Conclusion

For the foregoing reasons, the trial court's finding of anticipation [*17] of claims 1, 2, 5 and 6 of the '492 patent by Demmitt and its holding of obviousness of claims 7 and 10 of the '492 patent, in light of Demmitt, are affirmed, but the trial court's holding of obviousness of claim 20 of the '411 patent is reversed, and the case is remanded for trial on validity and infringement as to claim 20. The judgment of the U.S. District Court for the Central District of California regarding the invalidity of U.S. Patent Nos. 4,556,492 and 4,818,411 is thus affirmed-in-part, reversed-in-part, and remanded for further proceedings not inconsistent with this opinion.

Costs

Each party to bear its own costs.

CONCUR BY: NEWMAN (In Part)

DISSENT BY: NEWMAN (In Part)

DISSENT: NEWMAN, Circuit Judge, concurring in part and dissenting in part.

I write separately to explain why I do not share the

view of the panel majority that the '492 patent is invalid.

Anticipation

A finding of anticipation requires that the patented invention was previously known and is described in a single reference. However, my colleagues on this panel have not correctly perceived the technological substance of the Demmitt reference, on which they rely for anticipation. Demmitt reported a [*18] scientific study of the Houghton process, whereby he measured the amount of residual hydrazine by taking a sample of the aqueous stream, passing this sample through a cation exchange resin to remove materials that interfere with the measurement of hydrazine, and then measuring the hydrazine content of the sample. This is not the same as the Ecolochem deoxygenation process, wherein carbon catalyst-sourced impurities are removed, as a step in power plant and reactor water deoxygenation, by use of a mixed- or cation-exchange resin.

"Anticipation" means lack of novelty. The Houghton process had languished in disuse until Ecolochem solved the serious problem caused by the carbon-source impurities resulting from that process. Demmitt did not treat or solve that problem. Whatever the relation between Demmitt and the claimed invention, it is not "anticipation," n1 for Demmitt does not disclose the claimed invention.

n1 I do not say that anticipation requires "a literal word for word comparison," as the panel majority states. I do say that anticipation requires that the same invention be described in a single prior art reference. *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444, 221 U.S.P.Q. (BNA) 385, 388 (Fed. Cir.) ("Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention."), cert. dismissed sub nom. *Hazeltine Corp. v. RCA Corp.*, 468 U.S. 1228, 82 L. Ed. 2d 923, 105 S. Ct. 32 (1984). The Ecolochem claims require treatment of the entire reactor stream, including removing all of the carbon-source contaminants. Demmitt's purification of a small titer for analytical

purposes does not meet that criterion, explicitly or inherently.

[*19]

The Houghton process for removal of dissolved oxygen has long been known, but until Ecolochem's invention disclosed in the '492 patent, the utility of the Houghton process was limited because of the contaminants leached into the water from the carbon catalyst. The publications and other evidence of record show that this problem with the Houghton process was long-standing, and had impeded significant utilization of that process. The record shows that the Ecolochem invention was a widely recognized breakthrough in water purification processes. Demmitt's work twenty-three years earlier was unrelated to the removal of carbon-leached contaminants, as required by claim 1 of the '492 patent.

Nor can the dependent claims be anticipated by a reference that does not describe the added limitations in these claims. Indeed, the panel majority appears to recognize that claim 2 is not anticipated, but casually wipes out claim 2 with the statement that Ecolochem did not distinguish it. That is incorrect, for Ecolochem argued that "claim 2 requires the presence of a fourth filtration step to remove undissolved activated carbon contaminants" (emphasis in original). That step is not even remotely [*20] shown, or inherently present, in Demmitt. On no interpretation can Demmitt be found to anticipate claim 2. The panel majority holds that because Ecolochem distinguished claim 2 in only one part of its appellate brief, while stating in another part of the brief that claim 1 presents the central issue, then claim 2 is deemed abandoned on appeal. Claim 2 was not abandoned. It was retained, appealed, and distinguished as appropriate to its subject matter.

Obviousness

The panel majority holds that claims 7 and 10 of the '492 patent would have been obvious because the independent claims from which they depend are "anticipated" by Demmitt. Even if these claims were deemed to be anticipated--as they are not--this ground of "obviousness" is incorrect in law. 35 U.S.C. § 103 requires that obviousness be determined for the invention as a whole, in light of the prior art, not in light of other claims of the same patent. A patent's claims are not prior

art against itself. Further, while Ecolochem did not appeal the district court's decision as to all of the claims, that is not an admission as to the non-appealed subject matter. The narrowing of issues on appeal is to be commended, [*21] not punished.

Obviousness is determined as of the time the invention was made. The record documents the extensive efforts of others, and the complex procedures that were used by others, to remove dissolved oxygen. Ecolochem cites an early estimate that corrosion-caused replacement and repair costs ranged from \$ 50-100 million per year in the United States. J.H. Metcalf, *Inhibition and Corrosion Control Practices for Boiler Waters*, in *Corrosion Inhibitors 196* (C.C. Nathan, ed. 1973). The simple solution discovered by Ecolochem escaped all who came before, and was rapidly embraced and copied by those who came after.

The district court found that there was long-felt need, commercial success, and copying of the Ecolochem invention. Engineers directly involved in this field stated that the Ecolochem process had "unexpected" potential. The record shows the contemporaneous acclaim by persons and even industries that were concerned with the problem of large-scale deoxygenation of water. Indeed, the value of the Ecolochem invention transcended the power plant field; for example, a report praised the Ecolochem process as meeting the water deoxygenation needs of the pulp and paper industry. [*22]

It is in this practical milieu that the patent system exists, not the litigation-induced indulgence in hindsight. I can not agree with the panel majority that it would have been both known and obvious to engineers in this field to do what they did not do, to expect what they did not expect, in order to adapt the Houghton process to practical deoxygenation. Demmitt, Bechtel, and others rejected the Houghton process in face of the very problem that Ecolochem showed them how to solve. This is a classical example of misplaced judicial expertise, whereby a breakthrough that was lauded at the time and was accompanied by contemporaneous surprise at how it was accomplished, is now found by judges to have been obvious all along.

Statute and precedent require that obviousness be determined from the viewpoint of a person of ordinary skill at the time the invention was made. Insights to this determination are provided by the record in this case, which shows: (1) Demmitt's rejection of the Houghton

process for use at Hanford; (2) competitors' work with a palladium catalyst in order to avoid the problem of impurities from the carbon catalyst; (3) the failure of Bechtel, an engineering giant in [*23] this field, and of others, to solve the problem solved by Ecolochem; and of course (4) California Edison's insistence on continuing to use the Ecolochem process. It is not irrelevant that one of California Edison's engineers stated that "[Ecolochem] saved our ass" and "made heroes out of [names]."

That Ecolochem's solution to the problem of deoxygenation of ambient water in power plants and reactors is retrospectively simple is not the test of the law. Although the panel majority recognizes the important role of objective considerations in its reversal of the summary judgment with respect to the '411 patent, these considerations are also applicable to the '492 patent. The panel majority states at n.4 that the evidence of secondary considerations can not be considered, stating that the claims "fail to recite features employed by Ecolochem in its commercial embodiment." That is incorrect. The affidavits of commercial success and long-felt need relate to the claimed invention. They are powerful evidence in support of the conclusion that the invention was not obvious to a person of ordinary skill.

Thus I must, respectfully, dissent from the panel majority's decision and its analysis [*24] of fact and law concerning the '492 patent.

Additional Concerns

I briefly state some additional concerns with the panel majority's discussion of the legal premises of its decision. The majority states that it is no longer necessary to weigh objective evidence such as commercial success along with the other Graham factors; but instead sets this evidence in opposition to the other Graham factors, instructing the district court "to assess the prior art in light of the secondary considerations." That is an incorrect methodology. All evidence must be considered and weighed together, giving each aspect the probative value and credibility that its substance warrants, in determining whether the presumption of validity has been overcome. The contemporaneous views of the engineers who use and understand the technology must be considered along with the prior art, for these views place the invention in the proper context for adjudication.

I do not endorse the rules of claim construction proposed by the majority, for example with respect to the word "comprising." A patentee is not required to place in the claims every detail or step of the total process. It is incorrect [*25] to state that Ecolochem's evidence of commercial success does not relate to the patented process but to "unclaimed features," for it is the patented process that is commercially successful. Further, the mixed resin of claim 1 is an anionic/cationic resin.

EXHIBIT 11

CONFIDENTIAL EXHIBIT

EXHIBIT 12

IN THE UNITED STATES DISTRICT COURT
IN AND FOR THE DISTRICT OF DELAWARE

TELCORDIA TECHNOLOGIES INC., : Civil Action
:
Plaintiff/Counterclaim :
Defendant, :
:
:
v. :
:
LUCENT TECHNOLOGIES, INC., :
:
Defendant/Counterclaim :
Plaintiff. : No. 04-874-GMS

TELCORDIA TECHNOLOGIES, INC., : Civil Action
:
Plaintiff/Counterclaim :
Defendant, :
:
:
v. :
:
LUCENT TECHNOLOGIES INC., :
:
Defendant/Counterclaim :
Plaintiff. : No. 04-875-GMS

TELCORDIA TECHNOLOGIES, INC., : Civil Action
:
Plaintiff/Counterclaim :
Defendant, :
:
:
v. :
:
CISCO SYSTEMS, INC., :
:
Defendant/Counterclaim :
Plaintiff. : No. 04-876-GMS

Wilmington, Delaware
Wednesday, May 3, 2006
10:00 a.m.

BEFORE: HONORABLE GREGORY M. SLEET, U.S.D.C.J.

1 One issue that we don't contest but there
2 appears to be some confusion on in the briefing, in terms of
3 the word shared, we agree it is related to both the first
4 and the second ring. We have never argued that it's not.
5 The issue is both doesn't appear here but it does appear
6 here, so that's why there is confusion. They have it in
7 both places. We have it in neither. But we are not
8 contesting that it's related to both the first ring and the
9 second ring. The issue is what does the word shared mean.
10 It does not mean the same thing as associated.

11 In particular, we pull out the dictionary
12 related definitions. Related means associated. That is a
13 better definition for the term related.

14 Let me go back to the claim. We believe the
15 monitoring means doesn't have to be shared, whatever that
16 means. We believe --

17 THE COURT: Again, is this an important
18 distinction?

19 MR. REINES: We were planning to sit on our
20 briefs on this.

21 THE COURT: I think you should sit on their
22 briefs.

23 MR. REINES: I think for everything else he has
24 established, we were planning to do the same.

25 MR. ANZALONE: This one I wanted to discuss.

1 This is a particular example of what we call adding
2 limitations into the claim that appear nowhere in the claim
3 itself. They are incorporating things from one part in the
4 specification. In particular, we follow the claim language
5 and they add the term following the demultiplexing,
6 indicating that detection has to occur at a certain period
7 in time and insertion has to occur at a certain period in
8 time.

9 We believe our construction is consistent with
10 the language. The only reason it wouldn't be is if we
11 operate under some kind of disclaimer issue.

12 Defendants' construction is following the
13 demultiplexing. There is nothing in the claim language.
14 They are basically arguing on a disclaimer issue.

15 We point out that whether or not you detect
16 errors or whether or not you insert error signals before or
17 after demultiplexing doesn't affect whether you are
18 achieving the purpose of the invention, in terms of the
19 purpose of the invention being that you can send an error
20 signal on one or more of the rings is not suggested by the
21 prior art, that is what the examiner found is important.
22 Not when it was inserted, but the fact that there were error
23 signals that could then be evaluated.

24 That is also consistent with what we say in the
25 specification. Nowhere in the specification portions which

1 specifically talk about detecting or inserting error signals
2 do we indicate that it necessarily happens at a particular
3 point in time.

4 For instance, the selector makes its choice
5 based on the presence of an error signal. We don't say it
6 has to happen before or after demultiplexing. When we say
7 inserting an error signal on the line, we don't say it has
8 to happen before or after demultiplexing. The specification
9 leaves it open.

10 So defendants' objection is not to the clarity
11 of the claim but to breadth. They basically say, well, the
12 claim doesn't indicate when error signals are inserted. But
13 we would like to point out that the claims do indicate when
14 the error signal is imported in a relevant way. They
15 indicate the error signals are inserted in response to the
16 monitoring means detecting a lack of integrity. So an error
17 signal is detected whenever you find an error and detected
18 with the monitoring means. That is indicating when the
19 error signals are inserted. It doesn't have to happen
20 before or after another operation, demultiplexing, which,
21 after all, is more the focus of some of the other claims
22 that are not asserted in this case, I believe it's Claim 3
23 or 4 which specifically call out this demultiplexing stage.

24 We rely on the Liebel case, which says, in a
25 context which would be much more favorable to the defendants

1 than the one here, terms like opening is not ambiguous, no
2 reason to resolve it by reading it restrictively.

3 Here, we indicate when the error signals are
4 inserted in response to the monitoring means. No reason to
5 say it has to be in response to the monitoring means and
6 only after demultiplexing.

7 Now, defendants basically want to put in
8 limitations from the claims because of what happens in the
9 summary of the invention. In particular, the summary of the
10 invention has one statement that I will read to you. That
11 is in the summary at Column 1, Your Honor, Lines 53 to 55,
12 If a node detects a fault in an incoming line, an error
13 signal is placed on all of the channels following the
14 demultiplexer.

15 That is their only support in the entire patent
16 for this notion that the claim is limited to a situation
17 where not only are error signals inserted but they also say
18 they have to be detected following demultiplexing.

19 I would suggest that that is completely
20 controlled and contradicted by the Liebel case or Liebel
21 case, I don't know how it is pronounced. The specification
22 in this case contains no disclaimer: All that Medrad can
23 point to is an absence of any embodiment that lacks a
24 pressure jacket.

25 In particular, since in this case defendants are

1 relying on just a plain statement in the summary of the
2 invention and saying our claims are limited, I would like to
3 point out that in the Liebel case, the Federal Circuit in
4 2004 addressed exactly the same situation, because in the
5 Liebel case, they also had a situation, and I am quoting
6 from the Court, In the summary of the invention, the patents
7 provide, according to the principles of the invention, there
8 is provided an injector having a front-end-loadable syringe
9 that can be loaded into and removed from the injector
10 pressure jacket through an opening that is provided in the
11 front of the pressure jacket.

12 The Court went on to say, Even though that
13 statement in the summary of the invention said that the
14 invention, according to the principles of the invention, you
15 are using it with a pressure jacket, the Court of Appeals
16 said, those passages, though focusing on the use of the
17 invention in conjunction with the pressure jackets, do not
18 disclaim the use of the invention in the absence of a
19 pressure jacket.

20 We believe that is even more the case in the
21 '763 patent because unlike in the Liebel case, where they
22 said, according to the principles of the invention, you have
23 to use a certain jacket, here, all we have is a statement
24 that in this particular case the error signals are inserted
25 following the demultiplexing.

1 UPSR, all caps, right here, is their standard on
2 this patent. A ring is defined as a set of nodes and fibers
3 interconnected to form a closed loop.

4 So their own standard that they are saying this
5 patent -- they are saying this patent reads on, UPSR
6 standard, their own standard says a ring is defined as a set
7 of nodes and fibers interconnected to form a closed loop.
8 Their own standard on the patent.

9 Okay. So that's closed ring. It is a standard
10 closed ring. The purpose of the patent makes no sense
11 unless you have a closed ring. The prior art describes,
12 McNeilly described it as a closed ring. There is no reason
13 to think it is a loop that you could somehow draw on a mesh
14 network.

15 I think that is that one. That is pretty
16 simple.

17 Evaluating, the second major term. The others
18 are subsidiary. What are you evaluating the integrity of?
19 The Court got right to the issue, which is what is the
20 debate about multiplex subrate communications. I think I
21 can define it pretty clearly. You can read this term two
22 ways. One way that we read it is multiplexed subrate
23 communications is that high-level signal that is the overall
24 1's and 0's at the five channels that come in. That is the
25 multiplex subrate communication. They are multiplexed, and

1 it is the subrate communications. The way Telcordia is
2 attempting to construe it is, well, it means that, but it
3 could also mean each individual subrate communication while
4 it is multiplexed.

5 Do you see that distinction?

6 They are saying multiplexed subrate
7 communication is a constituent channel of the signal. There
8 is an ambiguity that they are attempting to exploit there.
9 Our point is, no, it is the high-level signal, because that
10 is the way the whole patent works.

11 I will now prove that up to you. It is a real
12 dispute. It is the main dispute on this patent after a
13 closed ring, which is what are you evaluating. Are you
14 evaluating the integrity of -- is there a line fault at the
15 gross level or are you really getting inside those 0's and
16 1's and looking at each individual channel? Which is what
17 they are now attempting to stretch the patent to claim.

18 That depends on the facts that multiplex subrate
19 communications can mean, at least arguably, either thing.
20 Does the node evaluate the high-level signal or just the
21 constituent channels that are traveling around within it?
22 Subrate communications are the constituent channels. The
23 multiplexed subrate communications is the high-level
24 communication.

25 How do we know that? The summary of the

1 invention. It says, While channels destined for downstream
2 nodes are multiplexed with originating local channels, and
3 the resultant high-level signal...

4 That's where we get that phrase. You remember,
5 back to the animation, high-level signal being the
6 high-level signal. I think you have got that one.

7 Then in the patent it says each node
8 continuously monitors and evaluates the integrity of the
9 multiplexed subrate signals arriving at the node. What
10 arrives at the node is the high-level signal. It is not the
11 constituent channels broken apart. It is just the
12 high-level multiplexed communication.

13 Here we look at it. 0's, all it is looking at
14 is whether there is a line fault. How do we know that?
15 This is the most important evidence you are going to get on
16 this question, no doubt.

17 What they say is when you are at Node 2, you
18 remember, we traveled onto Node 2 and we had some healthy
19 signals and some unhealthy signals, it said, because the
20 higher-level signal arriving to Node 2 on ring 100 appears
21 normal. This is the patent. So it is saying when you have
22 three error signals and three good signals at Node 2, it
23 appears normal because it is getting some communication.
24 All it can evaluate is whether there is a line fault. And
25 then it says, what do you have to do to figure out what is

1 going on? You have to demultiplex it into its six subrate
2 channels, three of which terminate. Once you multiplex it,
3 you see which one has the error signal on it. The point is
4 the patent concedes that when, on the second node, when the
5 signal comes in, there is a signal, and it is confused. It
6 thinks, okay, there is not a problem. Only after
7 demultiplexing it does it see the old error signals for the
8 particular channels which came from Node 4.

9 This is where the patent reveals what it is,
10 because the high-level signal arriving at Node 2 appears
11 normal. Well, if it detected the errors on a per-channel
12 basis, it would see them not as normal. It would see them
13 as erroneous.

14 Here we go. This is the animation you saw. It
15 appears normal. Now it's looking and serving an error
16 signal. This all ties together. Can error signals be
17 inserted at any time or only after demultiplexing? It can't
18 even detect the error until after demultiplexing. How can
19 it assert the error at any time before then?

20 The summary of the invention -- I will make
21 5:15, I think safely -- what is important here is, if a node
22 detects a fault in an incoming line, an error signal is
23 placed on all of the channels following the demultiplexing,
24 because the system can't deal with the high-level signal as
25 though it is each particular channel. It just looks like a

1 blur of 0's and 1's at the high level.

2 Here we go. The insertion has to happen after
3 the demultiplexing. It looks at the line fault and inserts
4 it on all of them.

5 Then the related step, you go through,
6 evaluating the high-level one, then you demultiplex it and
7 insert the errors. Now you detect the errors, and again,
8 the detection, detecting error signal on one or more of the
9 channels following the demultiplexing is that there is no
10 errors being detected on the high-level signal.

11 I mean, to cut through it all, Your Honor, there
12 is nothing in the patent that explains how someone would
13 wade into the high-level multiplex signal and start
14 discerning which channels are which, which are erroneous,
15 which have faults in them. There is nothing that describes
16 it. It determines whether there is a high-level line fault,
17 and then it puts an error signal on all of them after
18 demultiplexing and it detects it after demultiplexing.

19 I hope that was understandable. I hope that was
20 helpful.

21 This is showing the same thing.

22 I think I will end there to show you that I
23 recognized the 5:15 time.

24 THE COURT: Appreciate it, counsel.

25 Counsel for both sides, the Court will take the